

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

SYSTEM FOR REDUCING IR VISIBILITY OF AN AMPHIBIOUS VEHICLE

SPECIFICATION

FIELD OF THE INVENTION

The present invention relates to a water-going vehicle.
5 More particularly this invention concerns a system for reducing the infrared visibility of an amphibious vehicle.

BACKGROUND OF THE INVENTION

A particular problem facing military vehicles, in particular armored amphibious ones, is in reducing their infrared
10 visibility so that they do not form so-called hot spots that are easily detected at night by standard night-vision gear. It has been suggested to provide shielding for hot parts and means for mixing the hot exhaust gases with, for instance, coolant air. These expedients are often quite adequate when the vehicle is
15 moving on land where other infrared emissions make accurate spotting of a relatively cool hot spot fairly difficult.

When, however, the vehicle is moving over a body of water, it is much more difficult to mask the hot spot it creates, as the vehicle is against a cool and homogenous background. The
20 best known means are relatively ineffective when the hot vehicle

is on the water. Thus when crossing a river, for example, an amphibious vehicle is seriously exposed.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to
5 provide an improved system for reducing the infrared visibility of an amphibious vehicle.

Another object is the provision of such an improved system for reducing the infrared visibility of an amphibious vehicle which overcomes the above-given disadvantages, that is
10 which makes it very hard to spot even when on a body of water.

SUMMARY OF THE INVENTION

A system for reducing the infrared visibility of an amphibious vehicle that generates hot exhaust gas when it is in a body of water has according to the invention a nozzle directed
15 downward at and closely juxtaposed with a surface of the body of water. This nozzle expels the hot exhaust gas downward at the surface so as to form a water-droplet cloud that cools the gas and masks the vehicle.

By the simple expedient of using the energy in the hot
20 stream of exhaust gas that the vehicle creates to form a mist cloud, it is possible simultaneously to exploit the latent heat of evaporation of the droplets in the cloud to cool the exhaust

gas, and to use this cool cloud to actually mask the vehicle. The result is that, when water-borne, the vehicle according to the invention is not highly visible in the infrared spectrum.

According to the invention the nozzle is set at an angle of at most 60° to vertical. Thus the jet of hot exhaust gas issuing from it is able to physically raise a substantial mist cloud.

According to the invention means is provided for mixing cool ambient air with the hot exhaust gas prior to expelling the hot exhaust gas from the nozzle. This can be done by an ejector. Thus the outlet end of the exhaust system is formed as a nozzle directed into the end of a jet-type ejector that sucks in more air from outside. This simultaneously cools the exhaust gas while adding to it more air to increase the overall volume of flow. The nozzle itself forms a restriction such that the hot exhaust gas issues from it at high speed.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing whose sole figure is a partly schematic and diagrammatic view of the instant invention.

SPECIFIC DESCRIPTION

As seen in the drawing an amphibious vehicle 1 is situated partially submerged in a body 2 of water. This vehicle 1 has an exhaust system 3 with an outlet or tail pipe 4 that forms a nozzle 5 directed downward into an ejector tube 8. Air drawn in through the vehicle and deflected by vanes 7 moves as shown by arrows 6 into the inlet end of the ejector 8, drawn by standard jet-pump action.

According to the invention the outlet end of the ejector 8 is directed downward immediately adjacent the surface of the body 2 of water, at an angle α to the vertical of at most 60° . The speed of the hot gas column exiting the lower end of the ejector 8 and its proximity to the surface of the body 2 is such that it raises a cloud 9 of water mist.

This cloud 9 serves to cool the hot gases exiting the ejector 8 by the latent heat of evaporation in the droplets forming the cloud 9. In addition this cloud 9 itself masks the vehicle 1 so that a person on the other side of it using night-vision goggles will only see the cool cloud 9, not the hot vehicle on the other side of this cloud 9.